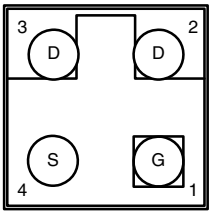
N-Channel 1.2 V (G-S) MOSFET

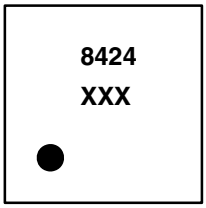
PRODUCT SUMMARY			
V_{DS} (V)	$R_{DS(on)}$ (Ω)	I_D (A)[a]	Q_g (Typ.)
8	0.031 at V_{GS} = 4.5 V	12.2	20 nC
	0.033 at V_{GS} = 2.5 V	11.6	
	0.035 at V_{GS} = 1.8 V	11.2	
	0.043 at V_{GS} = 1.5 V	10.2	
	0.077 at V_{GS} = 1.2 V	1.3	

MICRO FOOT

Bump Side View



Backside View



Device Marking: 8424
xxx = Date/Lot Traceability Code

Ordering Information: Si8424DB-T1-E1 (Lead (Pb)-free and Halogen-free)

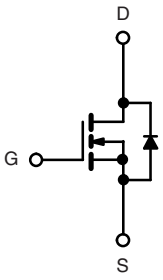
FEATURES

- TrenchFET® Power MOSFET
- Industry First 1.2 V Rated MOSFET
- Ultra Small MICRO FOOT® Chipscale Packaging Reduces Footprint Area, Profile (0.62 mm) and On-Resistance Per Footprint Area
- Material categorization: For definitions of compliance please see www.vishay.com/doc?99912

Pb-free
RoHS COMPLIANT
HALOGEN FREE

APPLICATIONS

- Low Threshold Load Switch for Portable Devices
  - Low Power Consumption
  - Increased Battery Life
- Ultra Low Voltage Load Switch



N-Channel MOSFET

ABSOLUTE MAXIMUM RATINGS (T_A = 25 °C, unless otherwise noted)				
Parameter		**Symbol**	**Limit**	**Unit**
Drain-Source Voltage		V_{DS}	8	V
Gate-Source Voltage		V_{GS}	± 5	
Continuous Drain Current (T_J = 150 °C)	T_C = 25 °C	I_D	12.2	A
	T_C = 70 °C		9.8	
	T_A = 25 °C		8.1[b,c]	
	T_A = 70 °C		6.5[b,c]	
Pulsed Drain Current		I_{DM}	20	
Continuous Source-Drain Diode Current	T_C = 25 °C	I_S	5.2	
	T_A = 25 °C		2.3[b,c]	
Maximum Power Dissipation	T_C = 25 °C	P_D	6.25	W
	T_C = 70 °C		4	
	T_A = 25 °C		2.78[b,c]	
	T_A = 70 °C		1.78[b,c]	
Operating Junction and Storage Temperature Range		T_J, T_{stg}	- 55 to 150	°C
Package Reflow Conditions[d]	IR/Convection		260	

Notes:
a. Based on T_C = 25 °C.
b. Surface mounted on 1" x 1" FR4 board.
c. t = 10 s.
d. Refer to IPC/JEDEC (J-STD-020), no manual or hand soldering.
e. In this document, any reference to the Case represents the body of the MICRO FOOT device and Foot is the bump.

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THERMAL RESISTANCE RATINGS

Parameter		Symbol	Typ.	Max.	Unit
Maximum Junction-to-Ambient[a,b]		R_{thJA}	35	45	°C/W
Maximum Junction-to-Foot (Drain)	Steady State	R_{thJF}	16	20	

Notes
a. Surface mounted on 1" x 1" FR4 board.
b. Maximum under steady state conditions is 72 °C/W.

SPECIFICATIONS (T_J = 25 °C, unless otherwise noted)

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Static						
Drain-Source Breakdown Voltage	V_{DS}	V_{GS} = 0 V, I_D = 250 µA	8			V
V_{DS} Temperature Coefficient	$\Delta V_{DS}/T_J$	I_D = 250 µA		8.9		mV/°C
$V_{GS(th)}$ Temperature Coefficient	$\Delta V_{GS(th)}/T_J$			- 2.5		
Gate-Source Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 250 µA	0.35		1	V
Gate-Source Leakage	I_{GSS}	V_{DS} = 0 V, V_{GS} = 5 V			100	nA
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 8 V, V_{GS} = 0 V			1	µA
		V_{DS} = 8 V, V_{GS} = 0 V , T_J = 70 °C			10	
On-State Drain Current[a]	$I_{D(on)}$	$V_{DS} \leq$ 5 V, V_{GS} = 4.5 V	20			A
Drain-Source On-State Resistance[a]	$R_{DS(on)}$	V_{GS} = 4.5 V, I_D = 1 A		0.025	0.031	Ω
		V_{GS} = 2.5 V, I_D = 1 A		0.027	0.033	
		V_{GS} = 1.8 V, I_D = 1 A		0.029	0.035	
		V_{GS} = 1.5 V, I_D = 1 A		0.032	0.043	
		V_{GS} = 1.2 V, I_D = 1 A		0.049	0.077	
Forward Transconductance[a]	g_{fs}	V_{DS} = 4 V, I_D = 1 A		8.3	13	S
Dynamic[b]						
Input Capacitance	C_{iss}	V_{DS} = 4 V, V_{GS} = 0 V, f = 1 MHz		1950		pF
Output Capacitance	C_{oss}			610		
Reverse Transfer Capacitance	C_{rss}			350		
Total Gate Charge	Q_g	V_{DS} = 4 V, V_{GS} = 5 V, I_D = 1 A		22	33	nC
		V_{DS} = 4 V, V_{GS} = 4.5 V, I_D = 1 A		20	30	
Gate-Source Charge	Q_{gs}			3.5		
Gate-Drain Charge	Q_{gd}			1.8		
Gate Resistance	R_g	V_{GS} = 0.1 V, f = 1 MHz		13		Ω
Turn-On Delay Time	$t_{d(on)}$	V_{DD} = 4 V, R_L = 4 Ω $I_D \cong$ 1 A, V_{GEN} = – 4.5 V, R_g = 1 Ω		8	12	ns
Rise Time	t_r			12	18	
Turn-Off Delay Time	$t_{d(off)}$			110	165	
Fall Time	t_f			40	60	

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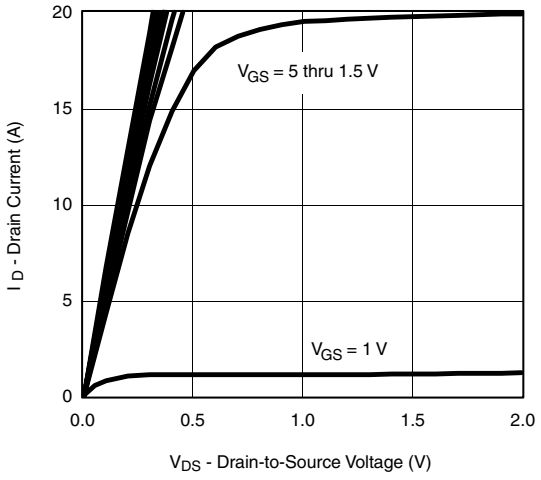
SPECIFICATIONS (T_J = 25 °C, unless otherwise noted)						
Parameter	**Symbol**	**Test Conditions**	**Min.**	**Typ.**	**Max.**	**Unit**
Drain-Source Body Diode Characteristics						
Continuous Source-Drain Diode Current	I_S	T_C = 25 °C			6.25	A
Pulse Diode Forward Current	I_{SM}				20	
Body Diode Voltage	V_{SD}	I_S = 1 A, V_{GS} = 0 V		0.6	1.2	V
Body Diode Reverse Recovery Time	t_{rr}	I_F = – 1 A, dI/dt = 100 A/µs, T_J = 25 °C		104	156	ns
Body Diode Reverse Recovery Charge	Q_{rr}			88	132	nC
Reverse Recovery Fall Time	t_a			26		ns
Reverse Recovery Rise Time	t_b			78		

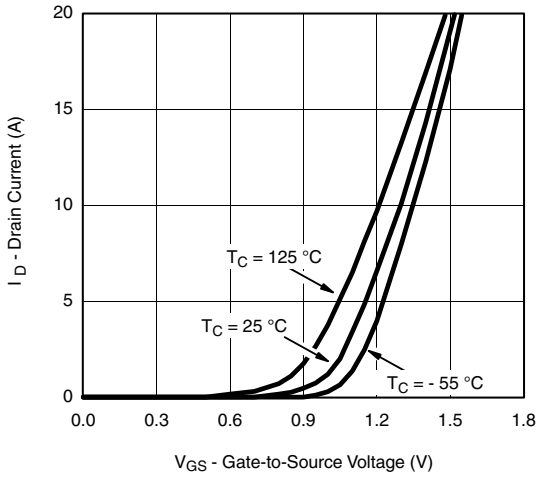
Notes:
a. Pulse test; pulse width ≤ 300 µs, duty cycle ≤ 2 %.
b. Guaranteed by design, not subject to production testing.

Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

TYPICAL CHARACTERISTICS (T_A = 25 °C, unless otherwise noted)



Output Characteristics



Transfer Characteristics

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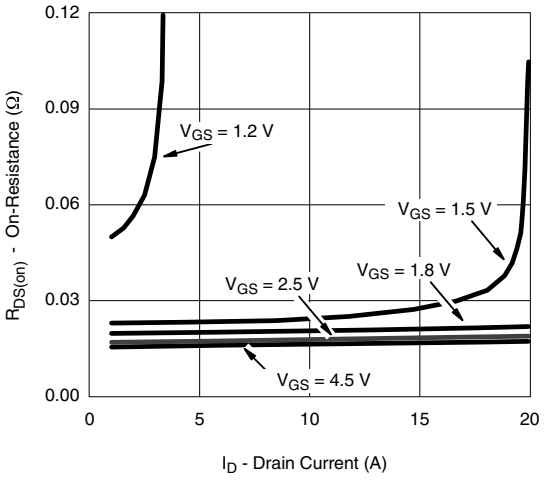
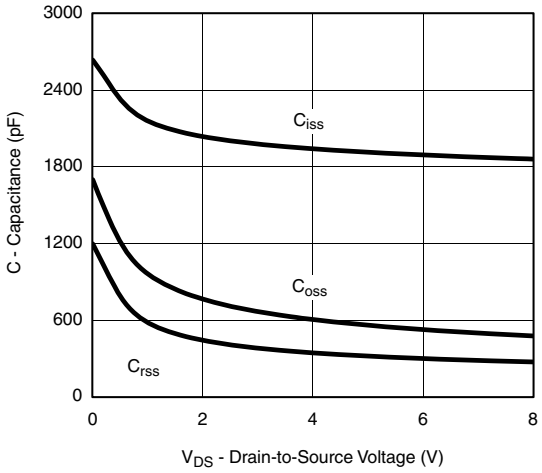
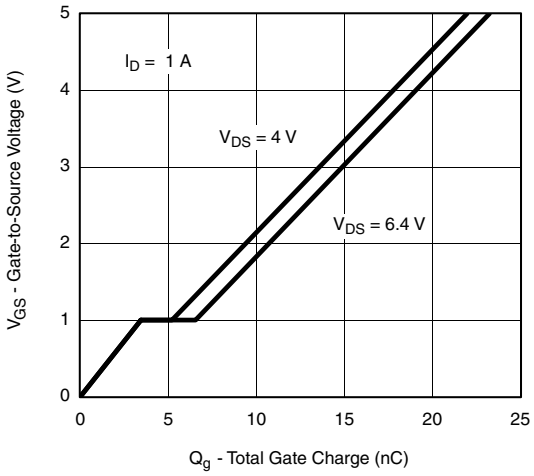


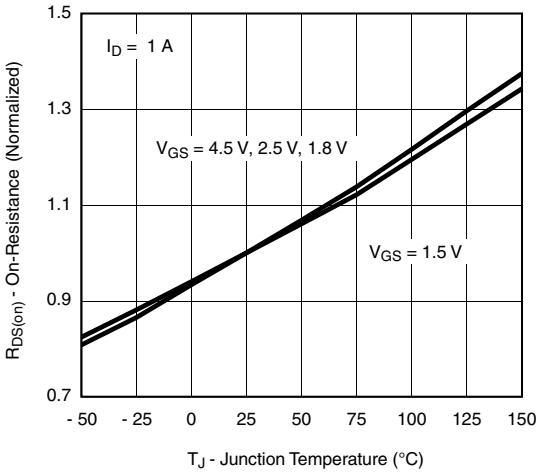
$R_{DS(on)}$ vs. Drain Current



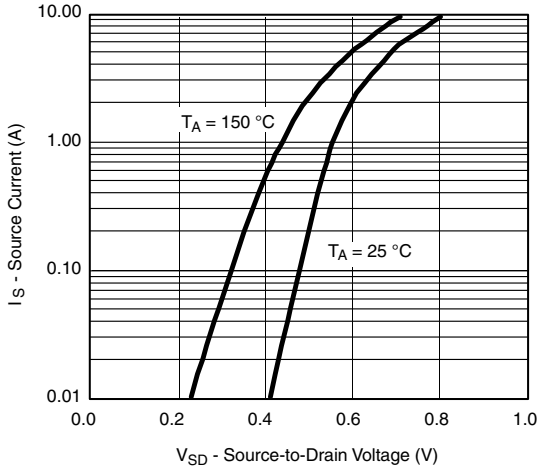
Capacitance



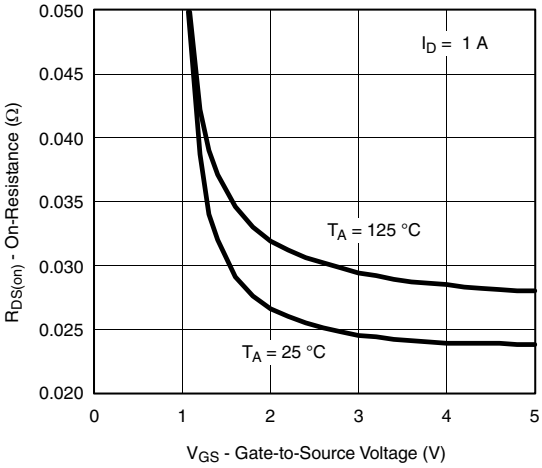
Gate Charge



On-Resistance vs. Junction Temperature



Forward Diode Voltage vs Temp



$R_{DS(on)}$ vs V_{GS} vs Temperature

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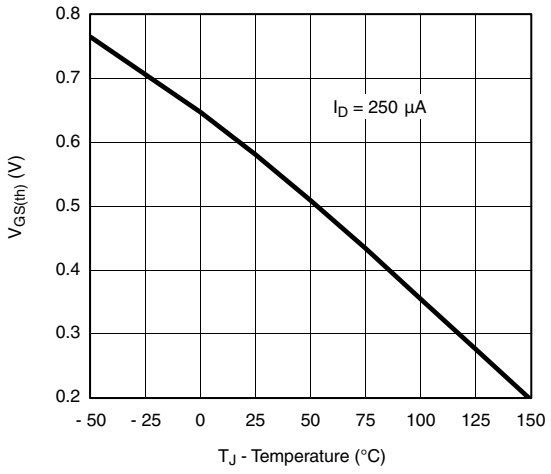
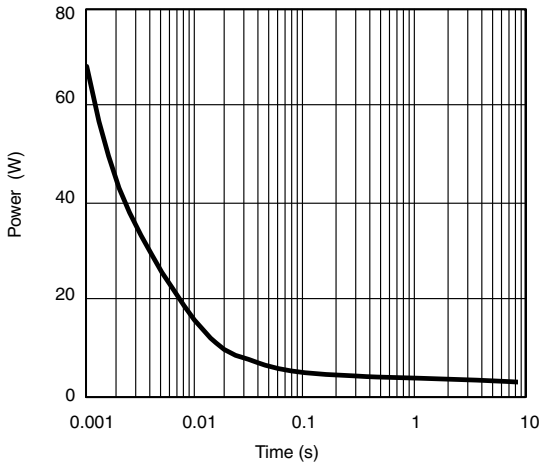
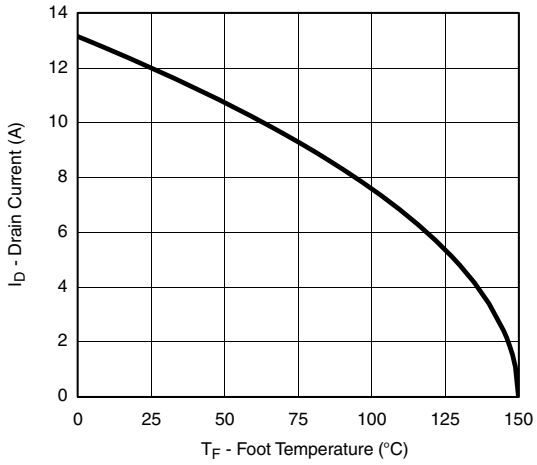


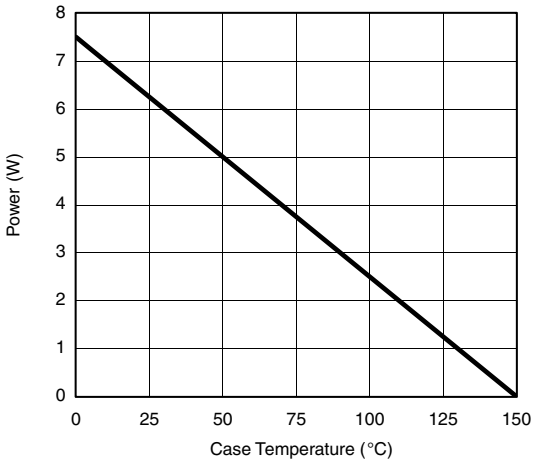
Threshold Voltage



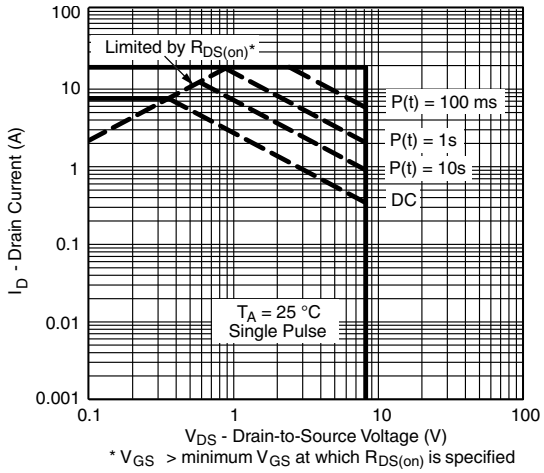
Single Pulse Power, Junction-to-Ambient



Current Derating**



Power Derating



Safe Operating Area, Junction-to-Ambient

*** The power dissipation P_D is based on $T_{J(max.)}$ = 150 °C, using junction-to-foot thermal resistance, and is more useful in settling the upper dissipation limit for cases where additional heatsinking is used. It is used to determine the current rating, when this rating falls below the package limit.*

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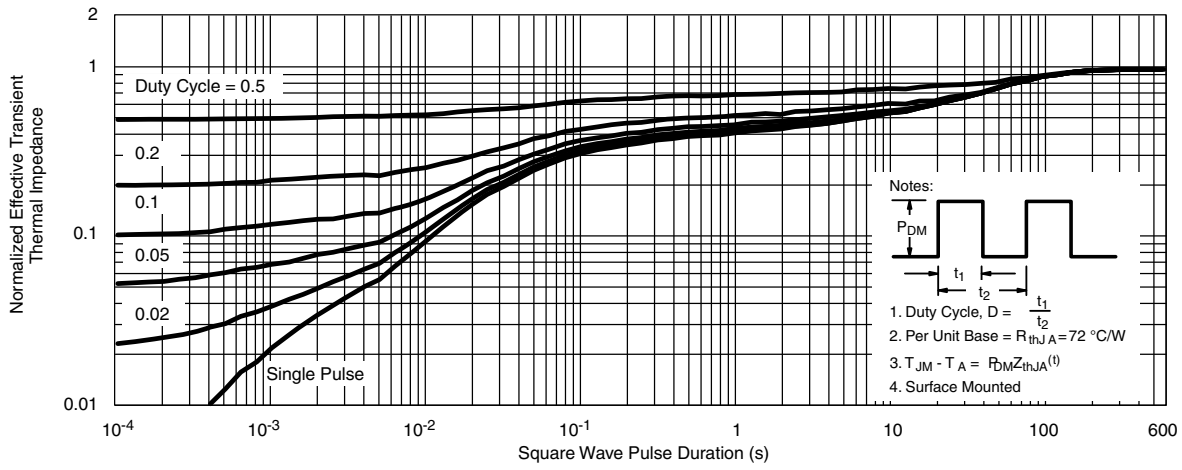
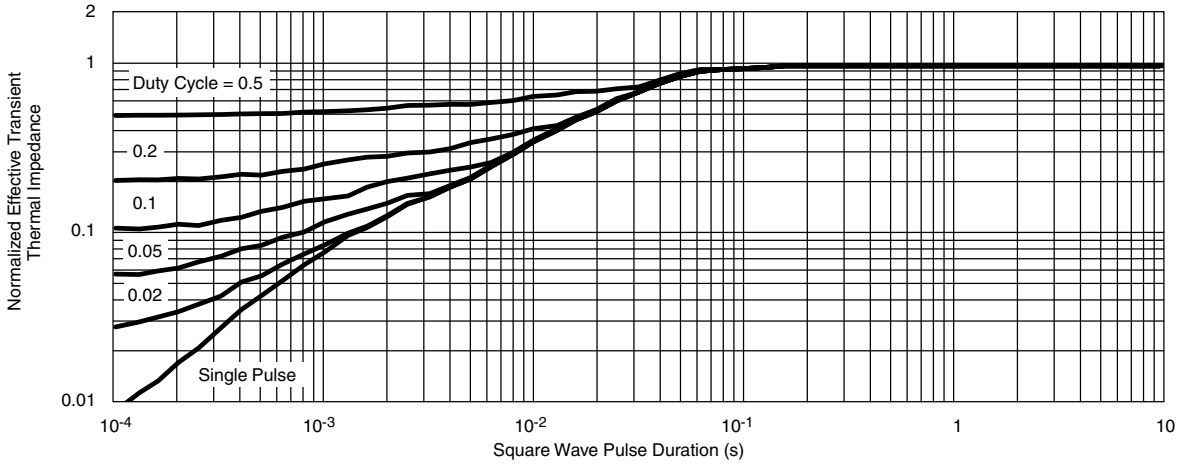


Normalized Thermal Transient Impedance, Junction-to-Ambient



Normalized Thermal Transient Impedance, Junction-to-Foot

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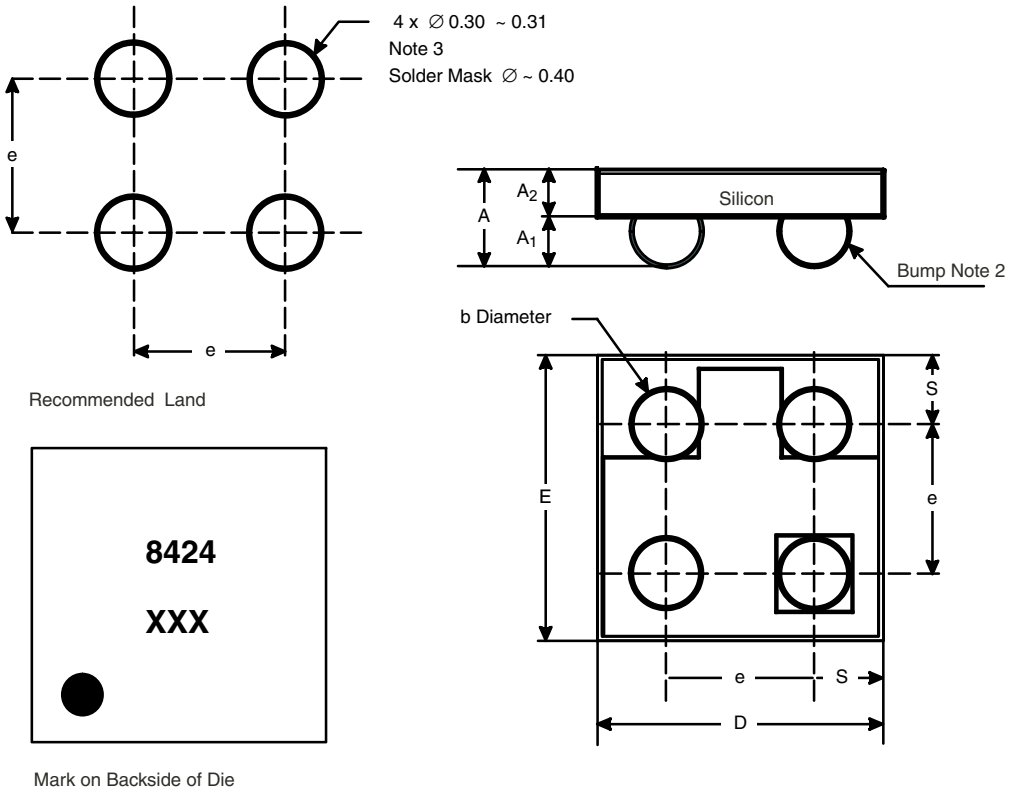
PACKAGE OUTLINE

MICRO FOOT: 4-BUMP (0.8-mm PITCH)



Notes (unless otherwise specified):
1. Laser mark on the silicon die back, coated with a thin metal.
2. Bumps are Sn/Ag/Cu.
3. Non-solder mask defined copper landing pad.
4. The flat side of wafers is oriented at the bottom.

Dim.	Millimeters[a]		Inches	
	Min.	Max.	Min.	Max.
A	0.600	0.650	0.0236	0.0256
A_1	0.260	0.290	0.0102	0.0114
A_2	0.340	0.360	0.0134	0.0142
b	0.370	0.410	0.0146	0.0161
D	1.520	1.600	0.0598	0.0630
E	1.520	1.600	0.0598	0.0630
e	0.800		0.0315	
S	0.360	0.400	0.0142	0.0157

Note:
a. Use millimeters as the primary measurement.

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